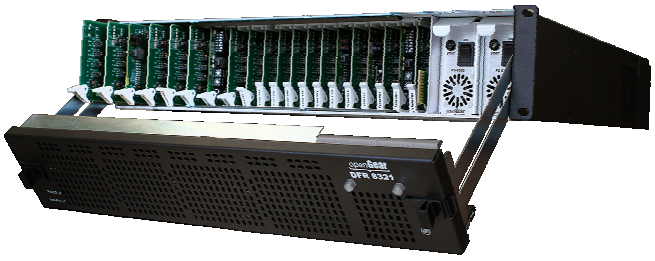
Cobalt Digital Inc.

OG3-FR Series

openGear® 2RU Frame and Power Supply

User Manual



OG3FR-OM (V1.1)

OG3-FR Series User Manual

- Part Number: **OG3FR-OM**
- Release Date: September 5, 2014 .

The information contained in this manual is subject to change without notice or obligation.

Copyright

© 2014 Cobalt Digital Inc. All rights reserved.

Contents of this publication may not be reproduced in any form without the written permission of Cobalt Digital Inc. Reproduction or reverse engineering of copyrighted software is prohibited. Content included here by permission.

Patents

This product is protected by the following US Patents: 4,205,346; 5,115,314; 5,280,346; 5,561,404; 7,034,886; 7,508,455; 7,602,446; 7,834,886. This product is protected by the following Canadian Patents: 2039277; 1237518; 1127289. Other patents pending.

Notice

The material in this manual is furnished for informational use only. It is subject to change without notice and should not be construed as a commitment by Cobalt Digital Inc. Cobalt Digital Inc. assumes no responsibility or liability for errors or inaccuracies that may appear in this manual.

Trademarks

- openGear is a registered trademark of Ross Video Limited.
- COBALT is a registered trademark of Cobalt Digital Inc.
- DashBoard Control System™ is a trademark of Ross Video Limited.
- All other product names and any registered and unregistered trademarks mentioned in this manual are used for identification purposes only and remain the exclusive property of their respective owners.

Important Regulatory and Safety Notices

Before using this product and any associated equipment, refer to the "Important Safety Instructions" listed below so as to avoid personnel injury and to prevent product damage.

Products may require specific equipment, and /or installation procedures be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these Specific requirements.

Symbol Meanings

This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.

Warning — *The symbol with the word **"Warning"** within the equipment manual indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.*

Caution — *The symbol with the word "**Caution**" within the equipment manual indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.*

Notice — *The symbol with the word "**Notice**" within the equipment manual indicates a situation, which if not avoided, may result in major or minor equipment damage or a situation which could place the equipment in a non-compliant operating state.*

Warning Hazardous Voltages — *This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product enclosure that may be of sufficient magnitude to constitute a risk of shock to persons.*

ESD Susceptibility — *This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.*

This symbol on the equipment indicates for use at altitudes of 2000m or less.

Important Safety Instructions

Read these instructions.

Keep these instructions.

Heed all warnings.

Follow all instructions.

Warning — *The safe operation of this product requires that a protective earth connection be provided. A grounding conductor in the equipment's supply cord provides this protective earth. To reduce the risk of electrical shock to the operator and service personnel, this ground conductor must be connected to an earthed ground.*

Use only power cords specified for this product and certified for the country of use.

Do not defeat the safety purpose of the grounding-type plug. A grounding type plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit in to your outlet, consult an electrician for replacement of the obsolete outlet.

Protect the power cord from being walked on or pinching particularly at plugs, convenience receptacles, and point where they exit from the apparatus.

Warning *Indoor Use: "WARNING – TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPERATUS TO RAIN OR MOISTURE".*

Do not use this apparatus near water.

Do not expose this equipment to dripping or splashing and ensure that no objects filled with liquids such as vases are placed on the apparatus.

Do not block any ventilation openings. Install in accordance with manufacturer's instructions.

Do not install near heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Only use attachments/accessories specified by the manufacturer.

Unplug this apparatus during lightning storms or when unused for long periods of time.

Clean only with a dry cloth.

Warning — *Refer all servicing to qualified personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug damage, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.*

Warning — *Certain parts of this equipment still present a safety hazard, with the power switch in the OFF position. To avoid electrical shock, disconnect all A/C power cords from the chassis' rear appliance connectors before servicing.*

Caution — *To reduce the risk of fire, replacement fuses must be the same type and rating.*

Caution — *Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after servicing.*

Warning — *This product contains safety critical parts, which if incorrectly replaced may present a risk of fire or electrical shock. Components contained within the product's power supplies and power supply area, are not intended to be customer serviced and should be returned to the factory for repair.*

Warning — *This product contains an "Ethernet Port" which allows this product to be connected to a local network (LAN). Only connect to networks that remain inside the building. Do not connect to networks that go outside the building.*

EMC Notices

US FCC Part 15

This equipment has been tested and found to comply with the limits for a class A Digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

Notice — *Changes or modifications to this equipment not expressly approved by Cobalt Digital Inc. Ltd. could void the user's authority to operate this equipment.*

CANADA

This Class "A" digital apparatus complies with Canadian ICES-003.

Cet appareil numerique de classe "A" est conforme à la norme NMB-003 du Canada.

EUROPE

This equipment is in compliance with the essential requirements and other relevant provisions of **CE Directive 93/68/EEC**.

INTERNATIONAL

This equipment has been tested to **CISPR 22:1997** along with amendments **A1:2000** and **A2:2002** and found to comply with the limits for a Class A Digital device.

Notice — *This is a Class A product. In domestic environments this product may cause radio interference in which case the user may have to take adequate measures.*

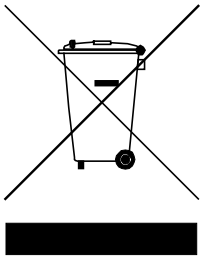
Maintenance/User Serviceable Parts

Routine maintenance to this product is not required. This product contains no user serviceable parts. If the frame does not appear to be working properly, please contact Technical Support using the numbers listed under the "Contact Us" section on the last page of this manual.

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, *Cobalt Digital Inc.* encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.
The crossed-out wheeled bin symbol invites you to use these systems.



If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

Contents

Introduction 1-1

In This Chapter 1-1
A Word of Thanks 1-1
Overview 1-2
Modular Frame Architecture 1-2
Robust Power Supply with Redundancy Option 1-2
Cooling 1-2
Additional Frame Accessories 1-2
Features 1-3
Documentation Terms and Conventions 1-4

Installation 2-1

In This Chapter 2-1
Before You Begin 2-2
Static Discharge 2-2
Unpacking 2-2
Installing a Frame 2-3
Overview 2-3
OG3-FR Series Frame Mounting Requirements 2-3
Installing the Rear Support Bars and Brackets 2-4
Installing the FSB-OG3 2-4
Front Panel Overview 2-6
Rear Panel Overview 2-7
Power Supplies and Power Cable 2-9
Required Power Supplies 2-9
Power Supply Connectors (PSU1, PSU2) 2-9
Installing the Frame Power Supply 2-9
Power Cable Connection 2-10
Ethernet Connections 2-11
OG3-FR Series Frames 2-11
Monitoring 2-12
OG3-FR Monitoring Features 2-12
Ventilation and Cooling 2-13
Overview 2-13
Installing a Rear Module 2-14
OG3-FR Series Setup 3-18
In This Chapter 3-18
GFC-8322 and Reference Overview 3-19
Installing the Controller Card 3-20
Ethernet Setup 3-20
Functions of the Network Controller Card 3-20
Controls and LEDs for the Network Controller Card 3-20
Setting Network Controller Card to Mute Audible Alarms 3-23
DashBoard and DashBoard Lite Control System Software 3-23
SNMP Monitoring and Control 3-23
Using the LCD Diagnostic Panel 3-25

Using the Toggle Button....3-25
Fan Filter Maintenance....3-26
Cleaning the Frame Air Filter....3-26
Replacing the Frame Air Filter....3-27
Replacing the Cooling Fan Module....3-28
Replacing the CFM-OG3 Cooling Fan Module....3-28
Specifications for the OG3-FR Series Frames....3-29
Service Information....6-30
In This Chapter....6-30
Troubleshooting Checklist....6-31
Warranty and Repair Policy....6-32
Ordering Information....7-33
Contact Cobalt Digital Inc....7-34
Visit us at the Cobalt Digital Inc. website....7-34

Introduction

In This Chapter

This chapter contains the following sections:

- Overview
- Features
- Documentation Terms and Conventions

A Word of Thanks

Congratulations on choosing the **OG3-FR 2RU Frame and Power Supply**. The Cobalt Digital Inc. **openGear**® line includes video decoders and encoders, audio embedders and de-embedders, distribution amplifiers, format converters, and much more. Cobalt Digital Inc. **openGear**® modular conversion gear will meet your signal conversion needs now, and well into the future.

Should you have questions or concerns pertaining to the installation or operation of your frame, please contact Cobalt Digital Inc. (Contact information is supplied on the back cover of this manual.) Our technical staff is always available for consultation, training, or service.

Overview

Your openGear frame is a 2RU modular frame, designed to accommodate openGear cards. A complete list of available openGear cards is available on our website.

Modular Frame Architecture

The openGear frame supports module-dependent rear modules. Rear modules can be ordered with cards, and are easy and quick to install.

OG3-FR Series Frames

The **OG3-FR series frames** offers the flexibility of independent rear modules for connectivity to a wide array of interfaces such as BNC, twisted-pair audio, and fiber. Using the split rear module allows for up to 20 cards to be installed (noting maximum user net power of 300W limit).

Note that cards and rear modules designed for the 8321 series frames are also supported by the OG3-FR series frames. However, some cards and rear modules may be designed specifically for the OG3-FR series frames only. Refer to the documentation for your openGear card for details on the frames you can use.

Robust Power Supply with Redundancy Option

The openGear frame can accommodate two front-loaded power supplies. However, each frame comes standard with one power supply. Although a single power supply can fully power a loaded frame, the addition of a second (optional) power supply gives the frame full power redundancy. Each power supply is fed by a separate power cord, which is held in position to guard against accidental power loss.

Cooling

The openGear frame has been designed with an advanced cooling architecture to increase ventilation. An intelligent fan controller adjusts fan speed with changes in frame power loading. Particular attention has been paid to frame acoustics in order to keep fan noise to a minimum.

The OG3-FR series frame is designed with front-door mounted fans to provide forced air cooling for all cards, and additional cooling for the power supplies.

Additional Frame Accessories

To help reduce mechanical stress due to cable weight, a rear frame support bracket is available for the frames.

Available Rear Support Brackets

Frame Model	Rear Support Bracket
OG3-FR	FSB-OG3

Features

The following standard features make our openGear frames the best solution for standard and high definition terminal equipment:

- Two independent looping reference inputs feed all card slots
- Can house any mix of analog, digital, video and audio cards in the same frame
- Available with individual card specific modules for connector flexibility
- Optional redundant power supply is hot-swappable for 24/7 operation
- Power switch is accessible from front of the rack frame
- Power supplies are replaceable from the front of the frame without requiring rear-frame access
- Separate power cords to each supply for power feed redundancy
- PowerLock cord retainer mechanism guards against accidental power loss
- Durable powder-coat paint finish
- Removable hinged front door for easy card insertion and removal, and flexibility in servicing the cooling fans
- Optional Ethernet based Frame Controller for remote setup, monitoring, and control

In addition to the standard features, the following additional features are available on the OG3-FR series frames:

- Aluminum and steel construction to reduce weight and increase strength
- 2RU Frame houses up to 20 cards, dissipating up to 15W per slot
- Robust power supply (300W user net) with two integral cooling fans per power supply
- Comes standard with the Cooling Fan Module for increased ventilation and enhanced reliability
- Supports Gigabit Ethernet connectivity to each openGear card in the frame (*requires the optional MFC-8322-N Network Controller Card*)
- Supports all existing rear modules designed for the 8321 series frames
- Provides a system alarm LED on the frame front door
- Provides an LCD Diagnostic Panel on frame front that reports the frame name, and IP address; provides the ability to scroll through these reported error/status conditions
- Removable door with durable powder-coat paint finish

Documentation Terms and Conventions

The following terms and conventions are used throughout this manual.

Terms

The following terms are used:

- "**20-slot frames**" refers to OG3-FR and 8321 series frames and any available options unless otherwise noted.
- "**Board**", and "**Card**" refer to openGear terminal devices within openGear frames, including all components and switches.
- "**Frame**" refers to any openGear frame within your video system.
- "**MFC-8322-N**" refers to the MFC-8322-N and MFC-8322-NS unless otherwise indicated.
- "**Network Controller Card**" refers to the MFC-8322-S, MFC-8322-N, and MFC-8322-NS unless otherwise indicated.
- "**openGear frame**" refers to an openGear® High Density Multi-Definition Frame.
- "**Operator**" and "**User**" refer to the person who uses the OG3-FR series frame.
- "**PSU1**" refers to Power Supply Unit 1 (primary) of the frame.
- "**PSU2**" refers to Power Supply Unit 2 (secondary) of the frame.
- "**System**" and "**Video system**" refer to the mix of interconnected production and terminal equipment in your environment.

Conventions

The following conventions are used:

- The "**Operating Tips**" and "**Note**" boxes are used to provide additional user information.

Installation

In This Chapter

This chapter provides basic instructions for installing the openGear frames.

The following topics are discussed:

- Before You Begin
- Installing an OG3-FR Series Frame
- Installing the Rear Support Bars and Brackets
- Front Panel Overview
- Rear Panel Overview
- Power Supply and Power Cables
- Ethernet Connections
- Monitoring
- Ventilation and Cooling
- Installing a Rear Module
- Installing an openGear Card

Before You Begin

Before proceeding with the instructions in this chapter, ensure that you read the following sections.

Static Discharge

Throughout this chapter, please heed the following cautionary note:

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas, and when wearing synthetic fiber clothing. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Unpacking

Unpack each openGear frame you received from the shipping container and ensure that all items are included. If any items are missing or damaged, contact your sales representative or Cobalt Digital Inc. directly.

Installing a Frame

This section outlines how to install an openGear frame. The same procedure is used to install a frame regardless of the model of frame unless otherwise noted.

Overview

The openGear frame mounts in the rack frame by means of four rack screws fastened through the front mounting ears. This should normally be sufficient to carry the load, including the weight of accompanying cables. However, in certain applications such as mobile truck installations, it may be desirable to also support the rear of the frame. The optional Rear Support Bars and Brackets are specifically engineered to compensate for extra load stress. Refer to the section "**Installing Rear Support Bars and Brackets**" for bracket installation instructions.

Installation Requirements

Keep the following in mind when installing your frame:

- Install the frame for maximum stability during operating and in such a way as to allow adequate ventilation.
- The frame cannot be sealed in a closed container and must be installed in free air space where the ambient temperature is monitored and controlled to not exceed 40°C (104°F) at the frame front door airflow intake.
- Ensure that adequate space exists in front and behind the frame and on both sides of the frame for airflow exhaust.
- The location of the frame should be accessible, dry, and dust-free.

Frame Dimensions

Note that each openGear frame installs in a standard 19" rack.

Frame Dimensions

Frame	Rack Units	Height	Depth	Width
OG3-FR	2 RU	3.5" (8.89cm)	17.7" (45cm)	19" (48.26cm)

OG3-FR Series Frame Mounting Requirements

Under some conditions, the ambient air temperature inside rack-mount cabinets can be greater that the ambient temperature within a room. For safe long term reliability, ensure the ambient air temperatures at the OG3-FR series frame front intake area are within the product's specified operating temperature range. Adequate ventilation within a rack frame must also be maintained. Ensure to adhere to the following clearance recommendations:

- Minimum 2" (5.08cm) clearance both right and left-hand side of the chassis sides with unrestricted vertical airflow.
- Minimum 5" (12.7cm) clearance at the chassis rear with unrestricted vertical airflow..

Installing the Rear Support Bars and Brackets

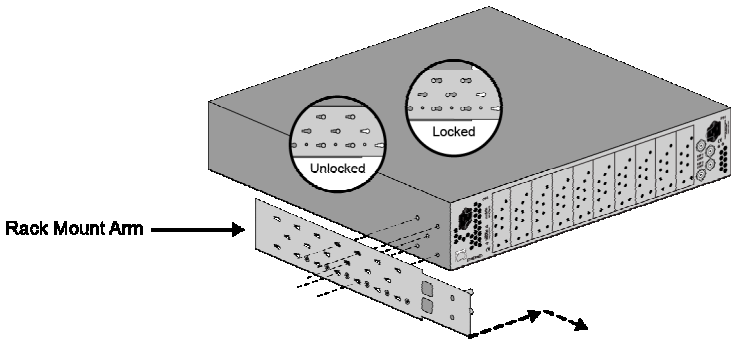
Under normal conditions, mounting the frame to the front of the rack with four rack screws should be sufficient to carry the load, including the weight of accompanying cables. The optional **Rear Support Bars and Brackets** are specifically engineered to compensate for extra load stress associated with certain applications, such as mobile truck installations, to also support the rear of the frame.

Installing the FSB-OG3

This section describes how to attach the FSB-OG3 rear support bars to a OG3-FR series frame.

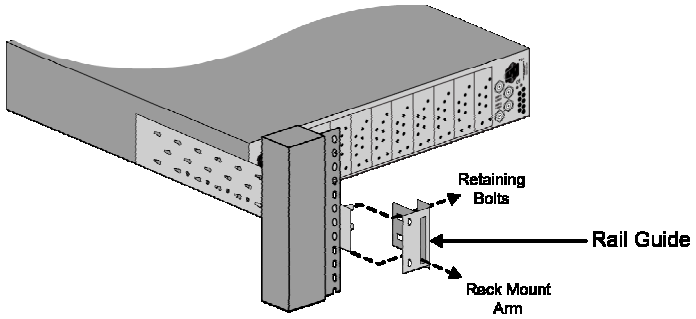
To install the FSB-OG3

1. Attach the Rack Mount Arms of the FSB-OG3 to the OG3-FR series frame.



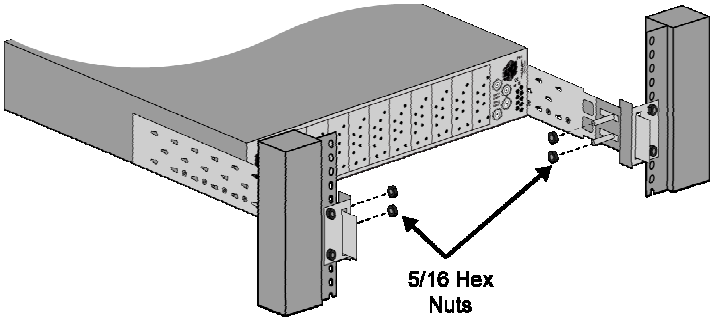
Installing a Rack Mount Arm

2. Install the Rail Guides for each Rack Mount Arm.



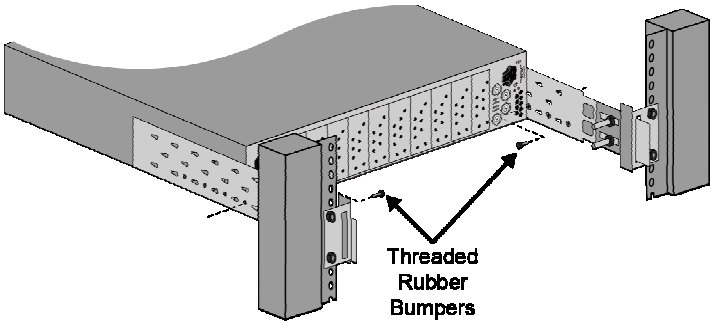
Installing a Rail Guide

3. Secure the Rail Guides and Rack Mount Arms to the rack.



Installing the Hex Nuts

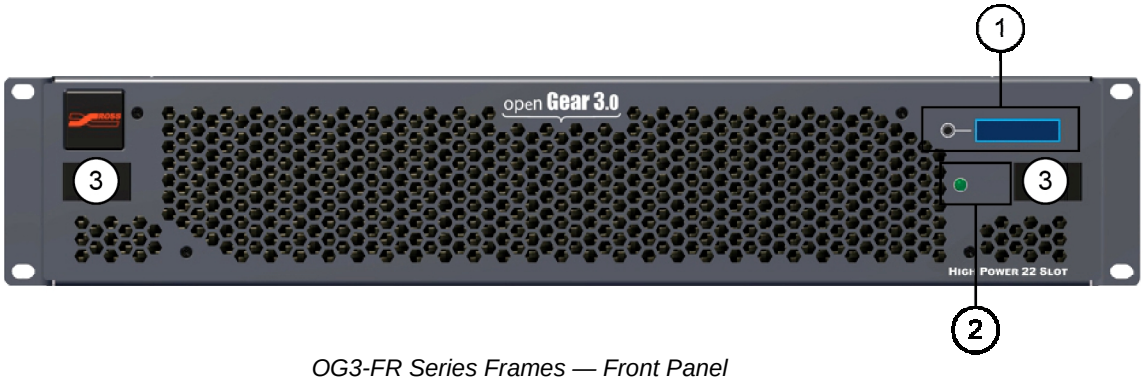
4. Use the provided Threaded Rubber Bumpers to lock the Rack Mount Arms in place.



Installing the Rubber Bumpers

Front Panel Overview

The openGear frames provide monitoring features on the front door. This section briefly summarizes the controls available on each frame model.



OG3-FR Series Frames — Front Panel

1. Diagnostic Panel	**3.** Door Tabs
2. STATUS/ALARM LED	

1. Diagnostic Panel

This area includes a two-line LCD Diagnostic Panel, and a toggle button. The diagnostic panel displays the following information in a scrolling format:

- The top line in the display cycles through the name assigned to the frame in DashBoard and the current IP address of the frame (or 0.0.0.0 if none available). The IP address is configured on the MFC-8322-N Network Controller Card.
- The second line reports errors or alarm conditions from any source. This includes fan failure alarms, power supply warnings, or errors reported by the cards installed in the frame. Messages are listed starting with the most recent.

Use the toggle button is used to cycle through the messages on the diagnostic panel when multiple errors are occurring. It also mutes the audio alarm..

2. STATUS/ALARM LED

Refer to the section "**OG3-FR Monitoring Features**" for details on this LED.

3. Door Tabs

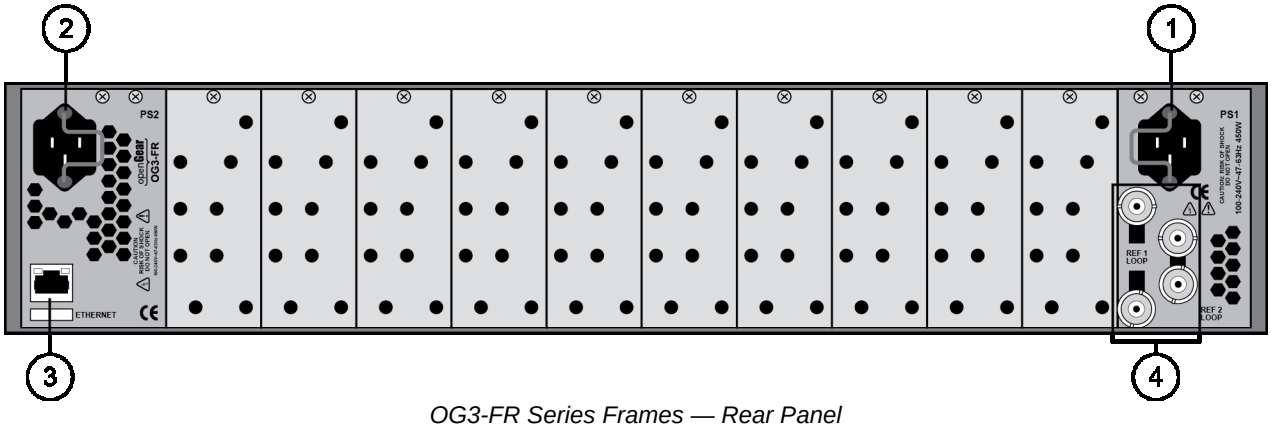
These tabs enable you to open the frame door and gain access to the interior of the frame. An alarm is raised when the frame door is opened longer than 5 minutes.

For More Information on…

- LCD Diagnostic Panel, refer to the section "**Using the LCD Diagnostic Panel**".

Rear Panel Overview

The rear panel provides the communication connectors for the openGear frame control and frame-wide references. The section summarizes the components available on the rear panels.



OG3-FR Series Frames — Rear Panel

1. PSU1 Power Supply Connector	**3.** Ethernet Communication Port
2. PSU2 Power Supply Connector	**4.** Reference Connectors

1. PSU1 Power Supply Connector

This connector is the AC Connector for the main power supply.

2. Power Supply Connector

This connector is the AC Connector for the redundant power supply.

3. Ethernet Communication Port

This Ethernet port is an RJ45 connector is used to connect the optional MFC-8322-N Network Controller card to an external Ethernet network. This Network Controller Card is required to bridge the external Ethernet network to the local communication bus for monitoring and control of cards installed in the OG3-FR series frames. Only cards having the Communication bus interface will be able to be monitored and controlled this way.

4. Reference Connectors

Two sets of looping BNC inputs are provided to accept two independent reference signals supporting the following reference signal types:

- Analog black
- Tri-level sync
- AES/DARS reference

This feature distributes one or two reference signals to all cards in the frame. Cards which need an external reference use this master reference signal in place of taking the signal from one of the card BNCs. This provides for ease of installation and reduction in reference cabling requirements. If this signal is required, it will be mentioned in the user documentation for your openGear card.

If only one reference type is required for the frame, connect it to the **REF 1** BNC. If the reference is not being looped to another frame or device, ensure that the **Loop Ref** BNC is terminated with a 75ohm terminator.

Power Supplies and Power Cable

The openGear frame comes standard with one power supply, with a second optional power supply available for redundancy. For redundancy, and in applications where the equipment is used in a critical signal path, we recommend that two power supplies be used in the openGear frame. One A/C power cable has been provided with each power supply ordered.

For further redundancy, each power cord should be connected to a separate power source for protection against failure of the A/C power circuit. In the event of one power supply failure, the frame load is seamlessly transferred to the other redundant power supply. Although the power supply is "hot-swappable" turning the power supply off before inserting or removing it from the frame will increase the life span of the connectors.

Required Power Supplies

The OG3-FR uses the PS-OG3 power supply.

Power Supply Connectors (PSU1, PSU2)

There are two power supply connectors located on the back of the openGear frame:

- **PSU1** — This connector is designated as the AC Connector for the main power supply.
- **PSU2** — This connector is designated as the AC Connector for the redundant power supply.

Installing the Frame Power Supply

The PS-OG3 is an auto-sensing supply, capable of working with all world AC standards (100-240V). Each supply has an indicator LED on the front, and an error detection circuit that will indicate the conditions.
The PS-OG3 power supplies install on the right and left sides of the OG3-FR series chassis.

To install the power supply

1. Carefully unpack the power supply from its box, and retain all packing material for future use, if required.
2. Align the power supply into an unused power slot on the right side of the frame.
3. Push the power supply in firmly to ensure a tight connection at the rear of the frame.

Power Cable Connection

This section includes information for connecting the power cables for the openGear frames.

Warning Hazardous Voltages — *The safe operation of this product requires that a protective earth connection be provided. This protective earth is provided by the grounding conductor in the equipment's supply cord. To reduce the risk of electrical shock to operator and service personnel, this ground conductor must be connected to an earthed ground.*

Warning — *In some countries, it may be necessary to supply the correct mains supply cord. Use only an approved IEC 320 C-13 type A/C line cord rated for a minimum 10A at 250V and certified for the country of use.*

To connect the power cables for an openGear frame

1. Connect the cable's female IEC connector to the frame socket marked **PSU 1**.
2. If the **Redundant Power Supply** option is installed, plug the second IEC connector into **PSU 2**.
3. Each AC connector includes a PowerLock, which is designed to retain the power cable connector. Clip the PowerLock over the shoulder of the inserted AC cable end.
4. Connect the supplied power cable's three-prong male connector to an AC outlet.

Ethernet Connections

You can monitor and control openGear cards in your openGear frame via the DashBoard client software. This requires a Network Controller card is installed and configured in your openGear frame. The exact steps for connecting to your facility via an ethernet network depends on the network requirements of your facility. Contact your IT Department before connecting to your facility network to ensure that there are no conflicts.

Note — *DashBoard uses the open SLP protocol to locate openGear frames on the network. In larger installations, it is recommended to use an SLP Directory Agent (DA). Contact your IT Department for more information on whether your facility uses an SLP DA.*

OG3-FR Series Frames

The **Ethernet** port is a standard 10/100/1000 RJ45 Ethernet connector and is used to exchange information with an external monitoring, or control, system over an ethernet network. You must have the MFC-8322-N installed in the frame to take advantage of the Gigabit ethernet connectivity available for cards in the OG3-FR series frame. The table below provides the wiring information based on the type of Network Controller card installed in the frame.

Use up to 100m of CAT6 cable or better for Gigabit Ethernet network or use up to 100m of CAT5 cable or better for 10/100Mbit Ethernet networks. The Ethernet port has its RJ45 connector wired as a Network Interface Card (NIC). The Ethernet port does not provide Power-over-Ethernet (PoE).

Ethernet Port Pinouts

Pin Number	MFC-8322-S (10/100 Ethernet)	MFC-8322-N (10/100/1000 Ethernet)
	Signal	Signal
1	Tx+	TD1+
2	Tx-	TD1-
3	Rx+	TD2+
4	*	TD2-
5	*	TD3+
6	Rx-	TD3-
7	*	TD4+
8	*	TD4-

* Shorted, 75ohm to Ground

Monitoring

This section briefly summarizes the LEDs located on the frame doors that provide monitoring features.

OG3-FR Monitoring Features

The table below outlines the LED located on the frame door below the LCD Diagnostic Panel.

Status LED Descriptions

LED	Location	Color	Description
	Frame Door	Green	When lit green, this LED indicates correct operation, and no errors or alarms are occurring.
		Red	When lit red, this LED indicates than alarm condition is present. This can be caused by a fan failure, power supply problem, or a missing GFC-8322 card. In some cases, certain cards can trigger the door alarm under specific conditions.
		Off	When off, this LED indicates that no power is going to the door.

Ventilation and Cooling

Your frame was specially engineered to minimize internal heat buildup and thus improve card reliability. For information on the power dissipation of openGear cards, refer to the user manual for your card.

Overview

For applications using less than 40W in a non-ventilated openGear frame, but where the individual card power consumption is greater than 8W, the cards should be evenly distributed in the frame. This will prevent the creation of concentrated heat, or unbalanced heat-rise areas, in the frame.

Notice — *For reliable performance, it is recommended that the frame door not be opened for longer than 5 minutes on frames loaded with more than 40W.*

OG3-FR Series Frames

The OG3-FR series frames come standard with a Cooling Fan Module installed in the frame door. The frame and PS-OG3 can supply up to a maximum of 300W of card power, with 15W per card. Under these ventilated conditions, there is no requirement for extra vertical spacing between the frames. The OG3-FR series frames can be stacked one on top of the other, a feature that is highly desirable in densely crowded rack frame environments.

Notice — *The two sides of the OG3-FR series frame have perforations that are needed to ventilate the power supplies and must not be blocked.*

Installing a Rear Module

Depending on the frame model you purchased, there may be variations in the BNC rear I/O modules connected to it. If the frame was ordered with cards requiring custom rear I/O modules, the appropriate modules will be installed at the factory or included with the card modules.

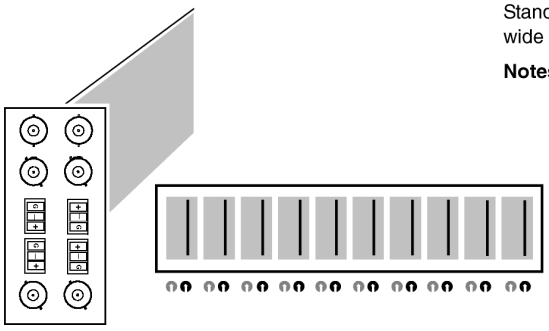
Note: Refer to card product manuals or catalog/web pages for rear modules available for the cards being installed.

BNC/Twisted-Pair Rear I/O Module

10 BNC Rear I/O Module

Blank Rear I/O Module

Standard-Width Rear Module



1 card per rear module
2 card slots used

10 cards per frame (max)
10 rear modules per frame (max)

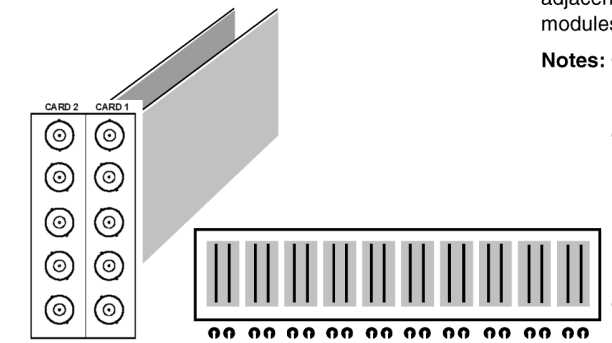
Standard-Width Rear Module occupies 2 card slots and can accommodate BNC and wired connections such as balanced audio and GPIO connections. Standard-width rear modules are available for all Cobalt cards, and offer a wide variety of signals accommodation choices in the smallest space.

Notes: • Not all slots can be fitted with cards when using a standard-width rear module (for example, when a standard-width module is fitted in the right-most frame position (viewed from rear), first available slot is slot 2, with slot 1 not being available.

• In all cases, maximum frame power budget for user slot total must be considered when planning frame build-out:
  • OG3 Frame: 300W user budget
  • HPF-9000 Frame: 360W user budget

If necessary, consult Cobalt Sales for assistance in power planning.

Split Rear Module



2 cards per rear module
2 card slots used

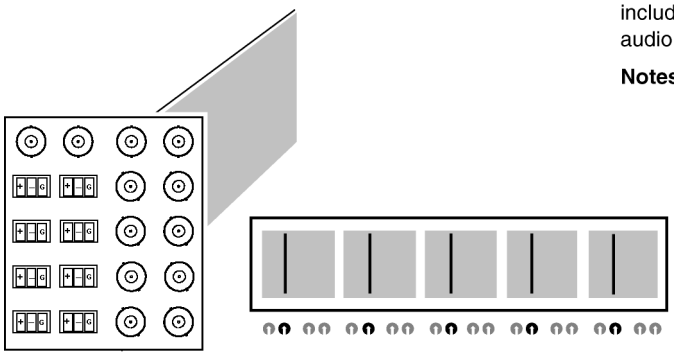
20 cards per frame (max)
10 rear modules per frame (max)

Split Rear Module occupies 2 card slots, but also accommodates 2 card in adjacent slots. In this manner, for a frame fitted entirely with split rear modules, the maximum 20-card frame capacity can be achieved.

Notes:
- Split rear modules are available only for certain Cobalt cards. Consult our catalog, card Product Manual, or our website for availability of rear modules for particular cards.
- Split rear modules may not in all cases support the maximum number of connections offered by a card. (For example, a 9323 card fitted with a split rear module offers two AES ports vs. four available when using a standard rear module. Some cards are available with split rear modules using high-density HD-BNC or DIN 1.0/2.3 connectors which allow more connections than with BNC connectors.)
- In all cases, maximum frame power budget for user slot total must be considered when planning frame build-out:
  - OG3 Frame: 300W user budget
  - HPF-9000 Frame: 360W user budget

If necessary, consult Cobalt Sales for assistance in power planning.

Double-Width Rear Module



1 card per rear module
4 card slots used

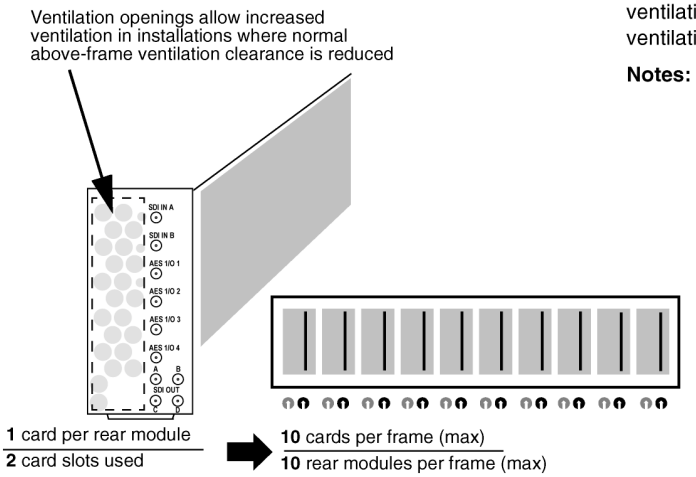
5 cards per frame (max)
5 rear modules per frame (max)

Double-Width Rear Module occupies 4 card slots and can accommodate a very high degree of signal count and types, including multiple BNC and wired connections such as balanced audio and GPIO connections.

Notes:
- Not all slots can be fitted with cards when using a double-width rear module (for example, when a double-width module is fitted in the right-most frame position (viewed from rear), first available slot is slot 2, with slot 1 not being available.
- In all cases, maximum frame power budget for user slot total must be considered when planning frame build-out:
  - OG3 Frame: 300W user budget
  - HPF-9000 Frame: 360W user budget

If necessary, consult Cobalt Sales for assistance in power planning.

High-Ventilation Rear Module


Ventilation openings allow increased ventilation in installations where normal above-frame ventilation clearance is reduced
SDI IN A
SDI IN B
AES I/O 1
AES I/O 2
AES I/O 3
AES I/O 4
A
B
SDI OUT
1 card per rear module
2 card slots used
10 cards per frame (max)
10 rear modules per frame (max)

High Ventilation (HV) Rear Module occupies 2 card slots and offers coaxial connections using miniaturized connectors (HDBNC or DIN 1.0/2.3). These rear modules have openings to increase ventilation where the normal recommended above-frame ventilation space (1 RU) cannot be accommodated.

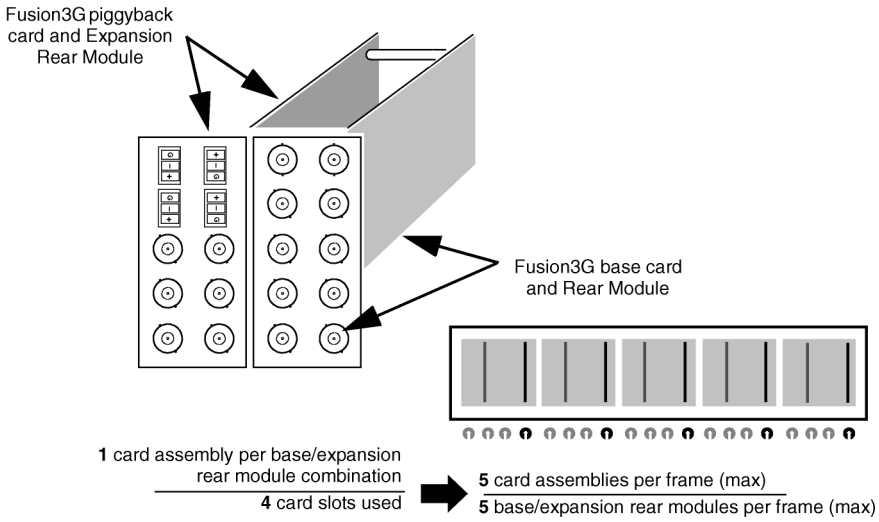
Notes: • HV (high-ventilation) rear modules are available only for certain Cobalt cards. Consult our catalog, card Product Manual, or our website for availability of high-ventilation rear modules for particular cards.

- (Fusion3G® only) Where a base HV rear module is to be used in conjunction with an expansion rear module, **a companion HV expansion rear module must also be used**. Both base and expansion HV rear modules use card positioning that optimizes air flow across the component surface of the card PCB. Also note that when using an expansion rear module, frame capacity then follows the form as specified in "Expansion Rear Module" above.
- In all cases, maximum frame power budget for user slot total must be considered when planning frame build-out:
  - OG3 Frame: 300W user budget
  - HPF-9000 Frame: 360W user budget

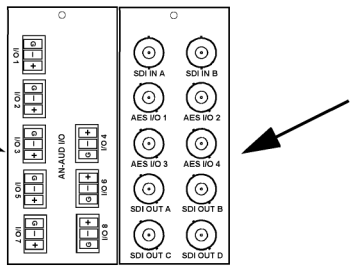
If necessary, consult Cobalt Sales for assistance in power planning.

Expansion Rear Module

(Fusion3G® only)


Fusion3G piggyback card and Expansion Rear Module
Fusion3G base card and Rear Module
1 card assembly per base/expansion rear module combination
4 card slots used
5 card assemblies per frame (max)
5 base/expansion rear modules per frame (max)

Expansion Rear Module installs directly to the **left** of base Rear Module, and interfaces with the piggyback card. In this example, an RM20-9901-XC expansion rear module breaks out analog audio connections provided by Option **+ANA** (analog audio option).



RM20-9901-B Rear Module provides connection break-out for base card functions.

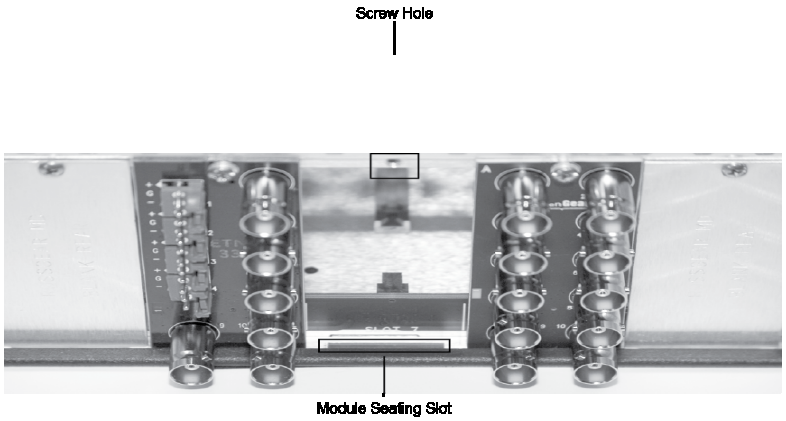
To install a Rear Module in an openGear frame

1. Ensure that the frame is properly installed.
2. Locate the card frame slot on the rear of the frame you wish to install the openGear card in.

    - Refer to the manual that accompanied your openGear card to determine if the card requires installation in a specific slot and which rear modules are supported by your card.
    - Determine the type of rear module you have. When installing a split rear module, remember that this module still requires two slots even though it accommodates two cards.

3. Seat the bottom of the Rear Module in the seating slot at the base of the frame back plane as shown below.

    - If you are installing a rear module in the OG3-FR series frames, there are two seating slots. Refer to the section "**Rear Modules for the OG3-FR Series Frames**" for details.



Rear Module Installation

4. Align the top screw of the Rear Module with the screw hole on the top edge of the frame back plane.
5. Ensure the module aligns with the desired card slot before tightening the screws.
6. Using a Phillips screwdriver and the supplied screw, fasten the rear module panel to the frame back plane. Do not over tighten.
7. Ensure proper frame cooling and ventilation by having all rear frame slots covered with rear modules or blank metal plates.
8. **Blank Rear Modules** (metal cover plates with mounting screw supplied with frame) are used when the slot does not have a card installed. This helps to ensure proper frame cooling and ventilation.

OG3-FR Series Setup

In This Chapter

This chapter provides information on setting up and using the OG3-FR series frame. The OG3-FR series frame is a 2RU modular frame, designed to accommodate up to 20 openGear cards.

The following topics are discussed:

- GFC-8322 and Reference Overview
- Using the LCD Diagnostic Panel
- Rear Modules for the OG3-FR Series Frames
- Fan Filter Maintenance
- Replacing the Cooling Fan Module
- Specifications for the OG3-FR Series Frames

GFC-8322 and Reference Overview

The GFC-8322 comes standard with every OG3-FR series frame. Its primary function is to distribute the reference signals to openGear cards installed in the frame. This section provides a general overview of the GFC-8322.

GFC-8322 Card

Location in Frame

When facing the frame door, the GFC-8322 is located on the left side of the OG3-FR series frame. This card comes pre-installed in the designated slot immediately to the right of **PS1**, and is secured with a metal retaining latch.

Reference Distribution

The GFC-8322 receives the analog reference signals driven to the **REF 1** and **REF 2** BNCs located on the rear panel of OG3-FR series frame. The GFC-8322 then distributes both reference signals to each of the 20 slots in the frame.

Parameter Storage

Frame settings such as the frame IP address, frame name, and the frame serial number are stored on the GFC-8322 via its Serial EEPROM.

Troubleshooting

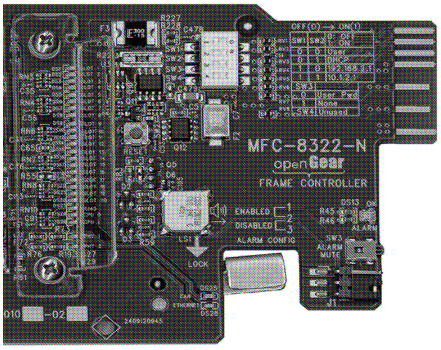
During normal operation, the GFC-8322 must never be removed from the OG3-FR series frame. To ensure this, the metal retaining latch located on the front of the GFC-8322 must be engaged (pushed down) to prevent accidental removal of the GFC-8322 from its slot.

Verify that the GFC-8322 is properly seated in its slot and the retaining latch is engaged when troubleshooting any of the following conditions:

- reference signals are unavailable to the cards installed in the frame
- loss of network connection or the network settings for the frame were reset to the default values

Installing the Controller Card

Use the following procedure to install the MFC-8322-N network controller card:



MFC-8322-N Network Controller Card with Latch Up

1. With the frame door open and the card latch **up**, slide the card into the controller slot (far right slot (22) as viewed from front).
2. Place the latch in the **down** position when fully inserted in slot.

Ethernet Setup

Refer to Cobalt® reference guide Remote Control User Guide (PN 9000RCS-RM) for step-by-step instructions for setting up network remote control of COMPASS™ cards using DashBoard™. Download a copy of this guide by clicking on the **Support** > **Documents** > **Reference Guides** link at www.cobaltdigital.com and then select DashBoard Remote Control Setup Guide as a download.

Functions of the Network Controller Card

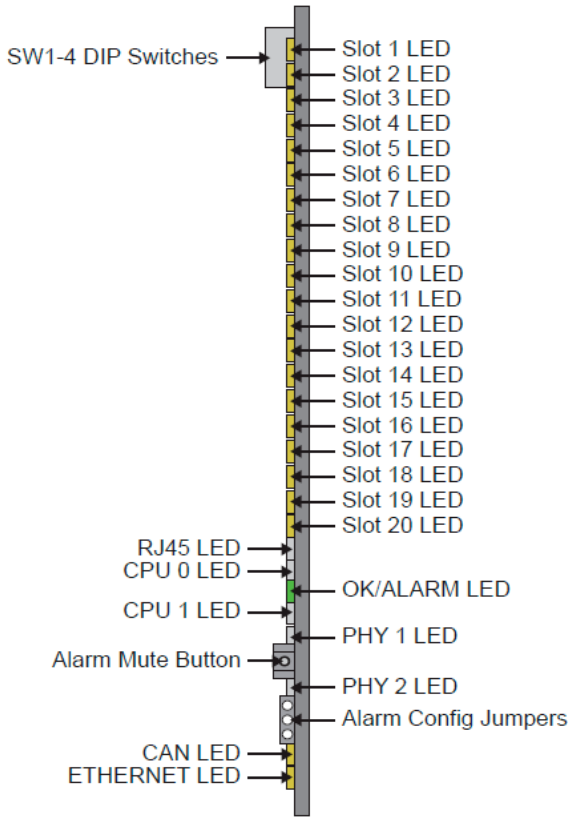
The MFC-8322-N network controller card performs the following functions:

- Monitors frame power usage and sets the fan speed accordingly (higher power consumption requires higher fan speed for adequate cooling). The fans always run at maximum speed for 5 seconds after the fan door is closed, then adjust to the appropriate level based on power consumption.
- Monitors the frame door and power supply(s) to ensure that fans in all units are operating correctly.
- Monitors the fan door and notifies the user if it is left open too long.
- Monitors the status of other cards in the frame via the internal bus.
- Generates alarms if any of the monitored functions develop errors.
- Provides an Ethernet connection to allow remote monitoring and control of the frame.

Controls and LEDs for the Network Controller Card

This section provides information on the controls and LEDs for the MFC-8322-N controller card. These are similar to the controls and LEDs on the MFC-8322, with some additional LEDs and DIP switches. The location of the controls are show in the following figures.

The LED indicators and controls for fan, alarm, and communication activity are shown in the following figure.



MFC-8322-N Card Edge Controls

LED	Color	Description
Slot #	Yellow	When lit, this LED indicates that the ethernet link to the specified frame slot is established (link is up).
	Flashing Yellow	When flashing, this LED indicates the ethernet link is established, and communication is currently taking place.
	Off	When off, this LED indicates that the ethernet link to the specified frame slot is unavailable (link is down).
RJ45	This LED reports the same information as the ETHERNET LED.	
OK/ALARM[a]	Green	When lit green, this LED indicates the card is operating correctly.
	Flashing Green	When flashing, this LED indicates a DataSafe mismatch.
	Red	When lit red, this LED indicates: • the card is booting, or • a major alarm condition is occurring in the frame such as the frame door has been left open too long.
CPU #	Yellow	When lit, this LED indicates that the ethernet link to the internal GigE switch is established (link is up).
	Flashing Yellow	When lit, this LED indicates that communication activity is occurring on the internal GigE switch.
	Off	When off, this LED indicates the ethernet link to the internal GigE switch is unavailable (link is down).
PHY 1	This LED reports the same information as the CPU 1 LED.	
PHY 2	This LED reports the same information as the CPU 0 LED.	
CAN	Flashing Yellow	When flashing yellow, this LED indicates the card is communicating, over the CAN bus, with the other cards within the frame.
	Off	When off, this LED indicates an absence of incoming messages.
ETHERNET	Yellow	When lit yellow, this LED indicates a valid ethernet connection but is not receiving messages from DashBoard, a control panel, or an external SNMP agent.
	Flashing Yellow	When flashing yellow, this LED indicates the card is communicating over the ethernet connection to DashBoard, a control panel, or an external SNMP agent.
	Off	When off, this LED indicates an absence of ethernet connection.

DIP Switches on the MFC-8322-N

This section briefly summarizes the DIP Switch settings on the card.

SW1 Position	SW2 Position	Controlled via DashBoard	Descriptions
OFF	OFF	✓	The card network settings can be set by the user from the DashBoard **Network** tab[a]. (default)
OFF	ON		The card network settings are automatically assigned (DHCP Mode).
ON	OFF		The card IP Address is set to 192.168.2.1 The card Subnet Mask is set to 255.255.255.0.
ON	ON		The card IP Address is set to 10.1.2.1. The card Subnet Mask is set to 255.255.255.0.

SW1, SW2 — IP Address Setup

SW1 and SW2 are used in conjunction with the DashBoard menus to set the IP Address of the card. Refer to the table above and the card labeling for DIP Switch positions.

- **ON** — This setting disables the audio alarm.
- **OFF** — This setting enables the audio alarm.

SW3 — Master Password Override

SW3 is used to override the Master Password. The Master Password feature limits the card to support only authenticated connections. Normal default position is **off**.

SW4

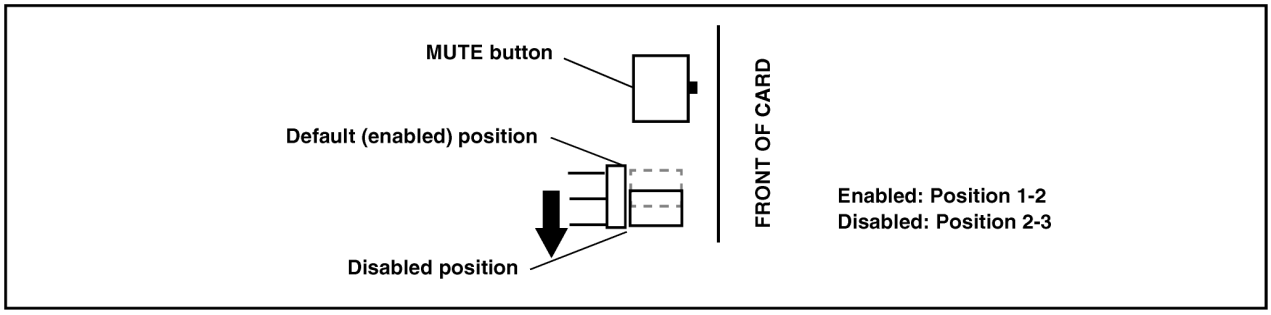
This switch is presently not used and should be left in the default **off** position.

SNMP Monitoring on the MFC-8322-NS

The MFC-8322-NS provides optional support for remote monitoring and control of your frame and openGear cards using SNMP (Simple Network Management Protocol), which is compatible with many third-party monitoring and control tools. You must obtain a license key from your openGear sales representative to enable SNMP support.

Setting Network Controller Card to Mute Audible Alarms

The frame has a pushbutton to temporarily mute the "beeper" on the card. However, to persistently mute audible alarms, set the Network Controller Card **ALARM CONFIG** jumper to the Disabled position as shown below.



DashBoard and DashBoard Lite Control System Software

You can use the DashBoard or DashBoard Lite Control Systems to monitor and control your frames and controller cards from a computer. The DashBoard software and manual can be downloaded from the Cobalt Digital Inc. website.

SNMP Monitoring and Control

The MFC-8322-N Network Controller card provides optional support for remote monitoring and control of your frame and its cards using SNMP (Simple Network Management Protocol), which is compatible with many third-party monitoring and control tools. This section describes how to enable this feature and how to configure the SNMP software on the card.

Enabling SNMP

You must obtain a license key from Cobalt Digital Inc. to enable SNMP support.

Use the following procedure to obtain your license key:

1. Request a license key from your distributor or at **sales@cobaltdigital.com**, quoting the 8-character hardware-ID provided on the page.

2. Open the **Frame Configuration Page** for the frame using DashBoard. **OR**

   Point your web browser to the IP address of the frame.

3. Select the tab titled **SNMP Configuration**.

   If SNMP has not been enabled, this page will ask you to enter a license key.

4. Enter the license key in the field provided.

5. Click **Submit**.

   After a valid license key has been entered, the frame displays the SNMP configuration page.

This completes the procedure to enable the SNMP agent on the frame.

Configuring SNMP

The SNMP agent on the frame will accept SNMP GET and SET requests on the default SNMP port (161), using SNMP version 1 or SNMP version 2c. The SNMP commands will send SNMP traps to one or more notification targets, with user-configurable address, port, and protocol version number.

Use the following procedure to configure your SNMP Agent:

1. Open the configuration page for the frame using DashBoard. **OR**

   Point your web browser to the IP address of the frame.

2. Select the tab titled **SNMP Configuration**.

3. Set the required parameters as follows:

   - **Read Community String** — Enter the SNMP password for GET requests.
   - **Write Community String** — Enter the SNMP password for SET requests.

4. To add a trap/notification target, specify the following:

   - **Target IP address —** Enter the IP address to which traps should be sent.
   - **Port number** — Enter the UDP port number to which traps should be sent.
   - **SNMP version** — Enter the protocol version to be used for traps to this target.
   - **Target community string** — Enter the community string.

5. Click **Add** to add the target to the list.

Operating Tip

To remove a trap/notification target, select the target in the list, and click **Delete.**

6. Click the **Submit** button to configure the frame.

This completes the procedure to configure your SNMP Agent.

Using the LCD Diagnostic Panel

The LCD Diagnostic panel is located on the frame front panel and enables you to quickly monitor the frame. Information is presented in two separate lines of text. The top line alternates displaying the IP address the frame is currently using and the frame name. The bottom line displays any alarm messages, such as fan failure, power supply issues, and error conditions that an installed card is currently reporting. The bottom line reflects the error conditions reported in DashBoard for the frame, and individual openGear cards installed in that frame.

LCD Display — IP Address of Frame

LCD Display — Frame Name

For More Information on…

- the types of error conditions that your openGear card reports, refer to the user manual that came with your card.
- setting the IP address and frame name in DashBoard, refer to the ***MFC-8300 Series User Manual***.

Using the Toggle Button

The toggle button is located directly to the left of the LCD Diagnostic Panel and enables you to:

- mute the audio alarm
- quickly scroll through the error messages reported on the second line of the diagnostic panel

To clear the audio alarm

1. Press the toggle button once to mute the audio alarm.

To scroll through the messages on the LCD Diagnostic Panel

1. Press the toggle button multiple times to scroll through the messages. The LCD Diagnostic Panel organizes the messages starting with the most recent at the top of the list.
2. If you are scrolling through the list and a new error condition is reported, the list is automatically updated and returns you to the beginning of the list.

Fan Filter Maintenance

Routine maintenance of the fan filter installed in the OG3-FR series frame is highly recommended to ensure proper airflow through the chassis.

Cleaning the Frame Air Filter

The OG3-FR series frame has a single air filter that is used to prevent dust and airborne particulates from contaminating the frame. This filter should be cleaned at least once a year; but may need to be cleaned more frequently in some environments.

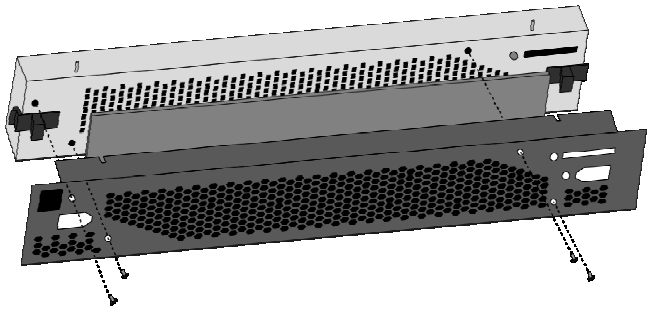
To clean the frame air filter

1. Remove the air filter from the frame door as follows:
2. Locate the four 3/16”screws (#850-091R) on the frame door faceplate. See below for screw locations.

OG3-FR Series Frame — Faceplate Screws Location

   - Using a Phillips screwdriver, remove the four screws that secure the faceplate. Set the screws aside.
   - Ensure that the side door tabs are disengaged from the door.
   - Remove the faceplate by gently pulling it towards you while avoiding the Diagnostic LED Display, the toggle buttons, and the monitoring LED.
   - Gently remove the air filter off the metal protective screen that separates the filter from the fans.
3. Brush any loose dust off of the filter.
4. Place the filter under warm running water to remove any remaining dust. On one side of the filter is a foam filter material. When rinsing, water should flow out of this side.
5. Remove the filter from the water and thoroughly pat dry with a towel to remove any moisture.
6. Replace the clean, dry filter into the frame door as follows:
   - Place the clean air filter across the metal protective screen, orienting it in the same position you found it in during step 1.
   - Install the faceplate by gently fitting it back onto the frame door, ensuring the faceplate does not interfere with the Diagnostic LED Display, the toggle button, and the monitoring LED.
   - Verify that the side door tabs are seated properly in the cutouts on the frame door bracket.

- Using a Phillips screwdriver, secure the faceplate using the four screws removed during step 1.



Replacing the Filter and Door

Replacing the Frame Air Filter

Should you need to replace the frame air filter in your OG3-FR series frame, you can order the Air Filter Kit (AFK-OG3) from your openGear sales representative.

To replace the frame air filter

1. Remove the old air filter from the frame door as follows:
   - Using a Phillips screwdriver, remove the four 3/16”screws (#850-091R) screws that secure the faceplate. Set the screws aside.
   - Ensure that the side door tabs are disengaged from the door.
   - Remove the faceplate by gently pulling it towards you while avoiding the Diagnostic LED Display, the toggle button, and the monitoring LED.
   - Gently remove the air filter off the metal protective screen that separates the filter from the fans.
2. Install the new filter into the frame door as follows:
   - Place the new air filter across the metal protective screen, orienting it in the same position you found it in during step 1.
   - Install the faceplate by gently fitting it back onto the frame door, ensuring the faceplate does not interfere with the Diagnostic LED Display, the toggle button, and the monitoring LED on the frame door.
   - Verify that the side door tabs are seated properly in the cutouts on the frame door bracket.
   - Using a Phillips screwdriver, secure the faceplate using the four screws removed during step 1.

Replacing the Cooling Fan Module

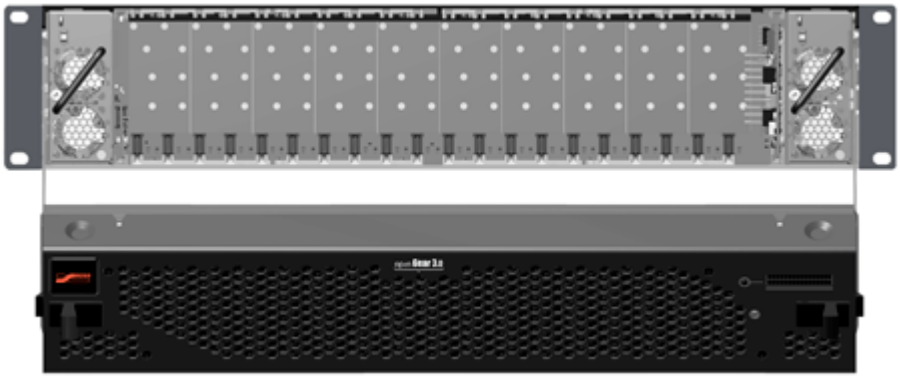
The OG3-FR series frames come standard with the Cooling Fan Module (CFM-OG3) pre-installed in the frame door as original equipment from the factory. However, if you need to replace the cooling fan module, the CFM-OG3 Replacement Kit is for field installation.

Replacing the CFM-OG3 Cooling Fan Module

The CFM-OG3 Replacement Kit includes the fan board and filter pre-installed in a new OG3-FR series frame door. You will need to remove the old door from your OG3-FR series frame and replace it with the new door.

To replace the CFM-OG3 Cooling Fan Module

1. Carefully remove the old door from the frame as follows:
2. Gently pull the side door tabs towards the center of the door, releasing the door from the frame. The door extender arms prevent the door from falling.



OG3-FR Series Frame Door — Open

- Using both hands, pull the door towards you.
- Tilt the door upward until the arms match the cutout.
- Gently push the door extender arms in and over the retaining bolts and unhook from the frame.
- Remove the door and place it on a clean, flat, static-free surface.

3. Install the new door in the frame as follows:
   - Using both hands, with the door tilted up, slide the new door into the frame while pushing the extender arms in and over the retaining bolts.
   - Pull and release the door tabs to ensure the frame door is securely locked to the OG3-FR series frame and that the tabs latch into the frame.

Specifications for the OG3-FR Series Frames

This section includes the technical specifications table for the OG3-FR series frame. Note that specifications are subject to change without notice.

OG3-FR Series Frame Technical Specifications

Category	Parameter	Specification
PS-OG3 Power Supply	Input	100-240VAC, 47-63Hz, 500W
	Output 1	12V, 28A, 336W nominal
	Output 2	-7.5V, 5A, 37.5W nominal
	Total	Sum of both outputs not to exceed 375W maximum
Dimensions	Height	2RU 3.5" (8.89cm)
	Width	19" (48.26cm)
	Depth	17.7” (45cm)
	Weight with two PS-OG3 installed	20lb (9.07kg)
Frame Card Slots	Number of Slots (User)	20
	Max. Power: +12V Rail	Per card occupying 4 slots: 5A, 60W
		Per card occupying 2 slots: 2.5A, 30W
		Per card occupying 1 slot: 1.25A, 15W
	Max. Power: -7.5V Rail	Per card occupying 4 slots: 0.8A, 6W
		Per card occupying 2 slots: 0.4A, 3W
		Per card occupying 1 slot: 0.2A, 1.5W
	Total	300W, total power consumption not to exceed 15W maximum per card slot
Reference Inputs	Number of Inputs	2 looping
	Level	1Vpp nominal
	Signal	Analog video sync (black burst or tri-level), or AES/EBU DARS
	Impedance	75ohm terminating
	Return Loss	>30dB to 30MHz
	Max DC on Ref Input	±1V
Environmental	Ambient temperature range	0ºC to 40ºC (32°F to 104°F)
	Humidity, non-condensing	<95%

Service Information

In This Chapter

This chapter contains the following sections:

- Troubleshooting Checklist
- Warranty and Repair Policy

Troubleshooting Checklist

Routine maintenance to this openGear product is not required. In the event of problems with your OG3-FR series frame, the following basic troubleshooting checklist may help identify the source of the problem. If the frame still does not appear to be working properly after checking all possible causes, please contact your openGear products distributor, or the Technical Support department at the numbers listed under the "**Contact Us**" section at the end of this manual.

1. **Visual Review –** Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the card, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check –** Check the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Input Signal Status –** Verify that source equipment is operating correctly and that a valid signal is being supplied.
4. **Output Signal Path –** Verify that destination equipment is operating correctly and receiving a valid signal.
5. **Unit Exchange** – Exchanging a suspect unit with a unit that is known to be working correctly is an efficient method for localizing problems to individual units.

Warranty and Repair Policy

Cobalt Digital Inc. Limited Warranty

This product is warranted to be free from defects in material and workmanship for a period of five (5) years from the date of shipment to the original purchaser, except that 4000, 5000, 6000, 8000 series power supplies, and Dolby® modules (where applicable) are warranted to be free from defects in material and workmanship for a period of one (1) year.

Cobalt Digital Inc.'s ("Cobalt") sole obligation under this warranty shall be limited to, at its option, (i) the repair or (ii) replacement of the product, and the determination of whether a defect is covered under this limited warranty shall be made at the sole discretion of Cobalt.

This limited warranty applies only to the original end-purchaser of the product, and is not assignable or transferrable therefrom. This warranty is limited to defects in material and workmanship, and shall not apply to acts of God, accidents, or negligence on behalf of the purchaser, and shall be voided upon the misuse, abuse, alteration, or modification of the product. Only Cobalt authorized factory representatives are authorized to make repairs to the product, and any unauthorized attempt to repair this product shall immediately void the warranty. Please contact Cobalt Technical Support for more information.

To facilitate the resolution of warranty related issues, Cobalt recommends registering the product by completing and returning a product registration form. In the event of a warrantable defect, the purchaser shall notify Cobalt with a description of the problem, and Cobalt shall provide the purchaser with a Return Material Authorization ("RMA"). For return, defective products should be double boxed, and sufficiently protected, in the original packaging, or equivalent, and shipped to the Cobalt Factory Service Center, postage prepaid and insured for the purchase price. The purchaser should include the RMA number, description of the problem encountered, date purchased, name of dealer purchased from, and serial number with the shipment.

Cobalt Digital Inc. Factory Service Center

2406 E. University Avenue	Office: (217) 344-1243
Urbana, IL 61802 USA	Fax: (217) 344-1245
www.cobaltdigital.com	Email: info@cobaltdigital.com

THIS LIMITED WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES ON COBALT'S PART. ANY SOFTWARE PROVIDED WITH, OR FOR USE WITH, THE PRODUCT IS PROVIDED "AS IS." THE BUYER OF THE PRODUCT ACKNOWLEDGES THAT NO OTHER REPRESENTATIONS WERE MADE OR RELIED UPON WITH RESPECT TO THE QUALITY AND FUNCTION OF THE GOODS HEREIN SOLD. COBALT PRODUCTS ARE NOT AUTHORIZED FOR USE IN LIFE SUPPORT APPLICATIONS.

COBALT'S LIABILITY, WHETHER IN CONTRACT, TORT, WARRANTY, OR OTHERWISE, IS LIMITED TO THE REPAIR OR REPLACEMENT, AT ITS OPTION, OF ANY DEFECTIVE PRODUCT, AND SHALL IN NO EVENT INCLUDE SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS), EVEN IF IT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Ordering Information

Your **openGear®** 2RU Frame and Power Supply is a part of the **openGear®** family of products.

Standard Equipment

- **OG3-FR** Digital Products Frame and Power Supply with Cooling Fans (2RU, holds 20 cards maximum)

Optional Equipment

- **PS-OG3** Power Supply, 300W user net (redundancy option power supply for Cobalt Digital Inc. OG3-FR series 2RU digital product frames)
- **MFC-8322-N openGear®** 2RU Frame Controller with Network Interface (upgrade controller card with Ethernet communication capability for use with OG3-FR frames)

Contact Us

Contact Cobalt Digital Inc.

PHONE	**General Business Office and Technical Support**	217.344.1243
	Fax	217.344.1245
E-MAIL	**General Information**	Info@cobaltdigital.com
	Sales Information	Sales@cobaltdigital.com
POSTAL SERVICE	**Cobalt Digital Inc.**	2406 East University Avenue Urbana, IL 61802 USA

Visit us at the Cobalt Digital Inc. website.

http://www.cobaltdigital.com/

- Online catalog
- Related products and full product lines
- Trade show information
- Dealer information
- Cobalt Digital Inc. news